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Yusuke Kubota & Robert D. Levine, *Type-Logical Syntax*. Cambridge, MA: MIT Press, 2020. Pp. xxii + 397.

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This terrific book is open-access! Everyone should download and read at least Chapter 2, 'Hybrid Type-Logical Categorial Grammar', which describes the approach in general terms, and then download whichever empirical applications are of most interest.

Kubota and Levine report on a decade of heavy lifting in their efforts to develop Hybrid Type-Logical Categorial Grammar (Hybrid TLCG), which they use to study a range of constructions that will make the heart of any syntactician beat faster: gapping, stripping, various exotic types of coordination, pseudogapping, ellipsis, islands, and more.

The handsome MIT Press book is lengthy, to be sure, at 397 pages; my copy weighs 742 grams. The cover has a lovely uncredited illustration that looks like Benoit Mandelbrot's dream of a green octopus arm growing delicate yellow whiskers. The page format is almost square, so there is a wide margin on the right hand edge of each page. There are 12 substantive chapters, a brief conclusion, an appendix giving formal rules, a bibliography, an author index, and a subject index.

Kubota and Levine are working within the tradition of Type-Logical Grammar. They emphasize the importance of syntactic categories by naming their approach (somewhat redundantly, in my view) Hybrid Type-Logical Categorial Grammar (see their footnote 3 on page xvi). I remain a bit puzzled about what motivates adding the word 'Hybrid' to the name, despite their comment on page 22 emphasizing that the logic handles both long-distance and local dependencies.

In the type-logical tradition, the syntactic merge operation is articulated into two categorial connectives that encode linear order: '\', which requires a complement to appear to the left, and '/', which requires a complement to appear to the right. So the linear-order sensitive refinement of the verb phrase *slept* should be *NP\S*: the kind of expression that can combine with an NP to its left in order to form a sentence.

The essential move that characterizes Hybrid TLCG is the addition of another variety of implication, written ' \uparrow ' (in LaTeX: \upharpoonright): neither leftleaning nor right-leaning, rather like the accent marks I used to put on my dictée in French class, hoping my instructor would assume I knew whether it was supposed to be grave or aigu. An expression in category $S \upharpoonright NP$, just like $NP \setminus S$ and S/NP, is an expression that requires the addition of an NP in order to form a complete S; but instead of requiring the NP to occur on the left (\) or the right (/), the NP must occur *somewhere inside* the S. Note that the hook of the harpoon points towards the category of the missing element.

In order for the new connective to work in the overall system, it is necessary to keep track of the exact position where the relevant NP is missing. Building on work of Oehrle, Muskens, de Groote, and others, the strategy deployed by Kubota and Levine is to build syntactic objects using lambda abstraction in the syntax. As in the semantic heavens, so in the syntax below: if the semantics can make use of lambda abstraction, why not the syntax too?

It will be easiest to explain what this means with a specific example. Chapter 3, 'Gapping', presents Gapping as the first detailed case study in the book.

(1) Ann bought a book, and Bill ____ a record.

Gapping is when a verbal element of the second of two coordinated clauses is missing, and gets interpreted as if a copy of the verb of the first clause were present. That is, (1) means the same thing as *Ann bought a book, and Bill bought a record*. On the surface, the second clause in (1) appears to be a clause missing a transitive verb, which in Hybrid TLCG has category $S \upharpoonright V$. Given that coordination always combines expressions of like category, if *Bill* ____ *a record* has category $S \upharpoonright V$, we must find an expression with category $S \upharpoonright V$ to serve as the left conjunct; the expression *Ann* ____ *a book* is what we need. We don't have that on the surface, as the left conjunct in (1) has an overt transitive verb, so this part of the analysis is somewhat abstract. In any case, the logic allows us to prove that the coordinate structure *Ann* ____ *a book and Bill* ____ *a record* has category $S \upharpoonright V$.

Once we have constructed a suitable coordinate structure with category $S \upharpoonright V$, it combines with its missing V argument (a transitive verb) semantically and syntactically in slightly different ways. This difference is managed by a special lexical entry for *and* that is specific to Gapping, which constructs the syntactic surface string by inserting the transitive verb into the left conjunct, while inserting the empty string into the right conjunct.

- (2) Semantics: $\lambda l_{vt} r_{vt} v_v . lv \wedge rv$
- (3) Syntax: $\lambda l_{st} r_{st} v_{st} . lv \circ and \circ r\varepsilon$

Here, objects of type vt are functions from verb meanings to sentence meanings, objects with type st are phonological strings, 'o' is string concatenation, and ε is the empty string. The net result after combining with the missing argument *bought* is the semantic value bought(ann)(a.book) \land bought(bill)(a.record), paired with the syntax Ann \circ bought \circ a \circ book \circ and \circ Bill $\circ \varepsilon \circ a \circ$ record.

All of the analyses in the rest of the book are some variation on this core technique, in which the semantics and the syntax are allowed access to internal positions via lambda abstraction, and those positions can be filled in ways that are not parallel between the semantics and the syntax.

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Chapter 4, 'Coordination and scope', covers one type of interaction of quantifier scope with coordinate structures. Kubota and Levine propose a new empirical generalization: that the configuration $[...Q...[\phi C\psi]]$, where Q is any generalized quantifier and C is a coordinating conjunction, is always ambiguous between a Q > C reading (the reading of No one ate a piece of apple pie and a piece of cherry *pie* that allows everyone to have a piece of pie) and a C > Q reading (the reading of Everyone wants apple pie or cherry pie that is compatible with the continuation '... but I don't remember which'). A technical note: the derivation of the second reading (which Kubota and Levine call the distributive reading) involves a technique they call 'slanting', which relies on theorems that allow replacing harpoons (' |`) with directional implications ('/' or '\'). They say (see, for instance, page 100) that 'slanting plays a crucial role' in their account. But the relevant examples all have alternative derivations that do not involve slanting - that is, on which the quantifier in question has category $S \upharpoonright (S \upharpoonright NP)$ and undergoes harpoon elimination immediately without any slanting - so I am left wondering whether slanting is indeed essential.

Chapter 5, 'The semantics of "respective," symmetrical, and summative predicates', offers a unified treatment of *respectively*, *same* and *different*, and summative predicates (such as *a total of* \$500). The key move replaces the usual join semilattice for plurals with tuples, so that *Ann and Bill called Carl and Delia, respectively* depends on finding a suitable relation between the tuples (**ann, bill**) and (**carl, delia**). Here, and throughout the book, the authors confront the myriad complexities of their ambitious and inclusive analyses head on, with impressively wide-ranging yet detailed empirical coverage.

These first five chapters cover coordination and related phenomena, the traditional wheelhouse of categorial approaches. The balance of the book goes beyond coordination.

Chapter 6, 'Pseudogapping', treats pseudogapping as a transitive verb ellipsis, a strategy first proposed by Jacobson for antecedent-contained deletion. One of the advantages of the type-logical approach is that although the proposed antecedent is not always a constituent in traditional theories, it is in type-logical accounts.

(4) You can't **take the lining out of** that coat. You can ____ this one.

The Hybrid TLCG derivation on page 180 derives *take the lining out of* as a (syntactically complex) transitive verb. Some more exotic psuedogapping examples motivate two discussions that contemplate adding some bells and whistles to the basic Hybrid TLCG logic. The first is conjunctive categories. If the verb *spoken* has the conjunctive category $VP/PP_{about} \wedge VP/PP_{of}$, this allows pseudogapping examples such as *Robin has spoken about the war, and Leslie of similar events*. The second is adding a wrap operation to handle discontinuous pseudogapping.

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Dual to conjunctive categories, Chapter 7, 'Filler-gap dependency', motivates disjunctive categories in the service of accounting for long-distance dependency marking in Irish. The challenge is that harpoon introduction allows extraction over an unbounded distance, ignoring intervening clause boundaries. The proposed solution is to distinguish expressions that move from expressions that don't move via a category feature ('+wh' versus '-wh'). This allows relativizers and complementizers to track extracted expressions via a (different) minor category feature (integer exponents, e.g. NP^2). In effect, the complementizer in Irish that marks extraction paths catches the extracted element before passing it upward, enforcing the equivalent of successive cyclic movement.

Chapter 8, 'Extraction/ellipsis interactions', builds on the proposed analysis of verb phrase ellipsis and psuedogapping from Chapter 6. Kubota and Levine argue against the popular assumption that ellipsis sites contain silent syntactic structure. Arguments motivating this doctrine involve islands, strong crossover, Principle B, parasitic gaps, and attributive comparatives. Postponing discussion of islands to Chapter 10, Kubota and Levine discuss the remaining arguments one by one, pursuing a divide-and-conquer strategy: in some cases, they dispute the empirical generalizations; in other cases, they accept the empirical claim, but suggest that unacceptability is due to pragmatic rather than grammatical factors; in still other cases, they advocate for analyses that do not depend on silent syntactic structure. Their most distinctive strategy reanalyzes key examples that appear to involve extraction from elided material as extraction of a pseudogapping remnant. For what it's worth, as an extremely rare instance in which Kubota and Levine do not provide exhaustively complete details, I was unable to unpack the argument sketched in Section 8.3.2, 'Ellipsis and SCO', involving ellipsis and strong crossover.

Remarkably, Kubota and Levine offer an account of Merchant's celebrated preposition-stranding generalization for sluicing. This generalization says that a language allows a *wh* sluice remnant to occur without a preposition only if the language also allows preposition stranding. As Kubota and Levine note, the empirical foundation of this claim has been challenged. Nevertheless, even taking the generalization at face value, they show how it would be possible to capture the constraint with independently motivated devices using an analysis that does not posit any syntactically complex silent material. Because of the importance of this result, I'd like to quote a plea from the authors (245):

We hope, however, that the fundamental simplicity of our solution will not become lost in these technical details. The central point is that in order to capture the P-stranding generalization, nothing more need be assumed than the independently needed lexical prohibition [of] NP_{+wh} arguments to prepositions in non-stranding languages and the independently motivated assumption that the anaphora recovery process in ellipsis is sensitive to the syntactic category of the antecedent expression.

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A similar thought resonates throughout the book: that the essential simplicity and directness of Kubota and Levine's analysis is sometimes in danger of being obscured by a welter of admirably honest but complicated technical detail.

In Chapter 9, 'English modal auxiliaries', Kubota and Levine reconstruct Iatridou and Zeijlstra's positive polarity/negative polarity analysis of the interaction of modals with negation. On the Kubota and Levine treatment, negation naturally takes scope over a clause. Of special note, they adapt the technique that they developed in Chapter 7 for dependency path marking in order to guarantee that negation never takes scope outside of its local clause. Roughly, each clauseembedding predicate (such as an attitude verb) increments a counter associated with the category of verbal projections. Negation lexically stipulates that the counter associated with its scope target is the same as the counter on its verb phrase complement. It would be intriguing to see how this approach would play out in an analysis of neg-raising.

At about 60 pages, Chapter 10, 'On functional constraints on extraction: The status of island constraints', is easily the longest chapter in the book, and is also distinguished by the fact that it contains zero harpoons (or any other technical details or derivations). It recapitulates the history of syntactic islands in some detail, then presents a survey of the evidence that 'islandhood is the by-product of complex interactions among functional factors' (326). On this assumption, Kubota and Levine discount arguments from putative island violations that favor analyses that depend on sensitivity to nonlocal features of syntactic structure. This stance allows them to dismiss putative island constraints as someone else's problem.

Chapter 11, 'Bringing back "hierarchical constituency": Multi-modal prosodic calculus and its empirical applications', explores adding additional *modes* to Hybrid TLCG: additional sets of connectives that behave differently with respect to certain syntactic properties, in the case at hand, with respect to associativity.

In Chapter 12, 'Comparison with other variants of categorial grammar', Kubota and Levine briefly discuss other especially closely related approaches. Linear Categorial Grammar is a fragment of Hybrid TLCG in which the only logical connective is *f*. This does remarkably well in many situations, but Kubota and Levine rehearse criticisms that, since linear order information no longer occurs in category labels, it is not possible to distinguish a sentence missing a subject from a sentence missing a direct object, which wreaks havoc in coordinate structures.

Two other approaches are particularly close to Hybrid TLCG: Morril and Valentín's Displacement Grammar, and my own NL_{λ} . As Kubota and Levine note, many of the empirical analyses discussed in the book – perhaps all of them – are intertranslatable among the three systems. In the case of Displacement Grammar, this is quite remarkable, as the technical details of the logic are dramatically different (hypersequents on the inference side and graded monoids on the semantic side). The resemblance between Hybrid TLCG and NL_{λ} is more obvious, as the

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structural postulates are identical; residuated implications "/" and " $\$ " of NL_{λ} stand in the same relation to the Hybrid TLCG harpoon that / and $\$ stand to the intuitionistic implication.

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